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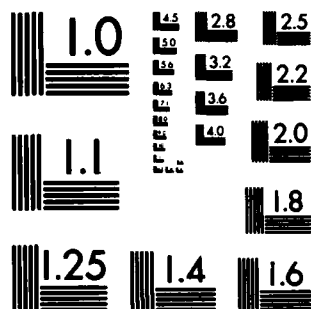   WRIGHT-PATTERSON AFB OH SCHOOL OF SYST..
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Wright-Patterson Air Force Base, Ohio

A CASE STUDY OF AN AERONAUTICAL SYSTEMS DIVISION SYSTEM PROGRAM OFFICE

David B. Hulslander, Captain, USAF
Keith E. Matthews, Captain, USAF

LSSR 12-82

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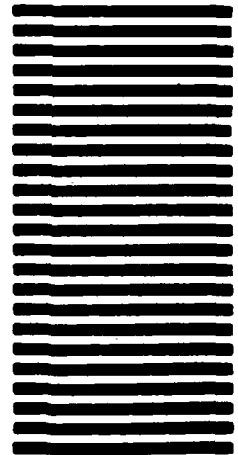PENALTY FOR PRIVATE USE. $300

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

See reverse side

This thesis presents a case study written for use in an AFIT course, SYS 400 "Intermediate Program Management". The case is divided into four sections. The first section presents the overall management structure and operations of the Avionics and Aircraft Accessories System Program Office (SPO). The second section deals specifically with one program within the standard Aircraft Sensor Unit (ASU) program. It describes some of the background of the program, but it concentrates on the period July 1980 — February 1981, describing the problems encountered during the initial production. A list of program-unique terms and their definitions is given in the third section, and the fourth section is a list of questions designed to stimulate discussion. An analysis of the case is also part of the thesis, giving one possible interpretation of the problems encountered and the solutions used. The thesis concludes with a recommendation to develop case studies of other types of SPOs, showing the different problems the different SPOs encounter.

A CASE STUDY OF AN AERONAUTICAL

SYSTEMS DIVISION SYSTEM PROGRAM OFFICE

A Thesis

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Systems Management

By

David B. Hulslander, BA   Keith E. Matthews, BS
Captain, USAF   Captain, USAF

September 1982

This thesis, written by

        Captain David B. Hulslander

              and

        Captain Keith E. Matthews

has been accepted by the undersigned on behalf of the faculty of the School of Systems and Logistics in partial fulfillment of the requirements for the degree of

        MASTER OF SCIENCE IN SYSTEMS MANAGEMENT

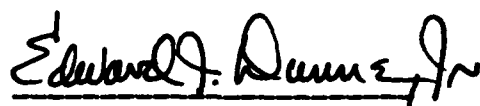DATE: 29 September 1982

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CHAPTER 1

INTRODUCTION

This thesis examines management as applied in the Aeronautical Systems Division's Avionics and Aircraft Accessories System Program Office (SPO). The examination was accomplished by the preparation of a case study, which is a record of issues which have actually been faced by the SPO managers, together with surrounding facts, opinions, and prejudices upon which the decisions were derived. The case study is an attempt to capture the experience and judgement of the SPO managers and make these attributes available to others.

BACKGROUND

The case method, which is the use of a description of a situation (the case study) as a means of teaching, a way of initiating discussion, or to illustrate some point, has a long history. Some of the earliest examples are the use of parables in the New Testament as a means of illustrating certain moral principles.

The widespread use of case studies in formal education started at the Harvard Law School in 1871, with a casebook on the law of contracts by Christopher C. Langbell. This method of instruction was widely ridiculed at first; critics claimed that it would not be possible to judge any future case unless it was exactly identical to a case already studied. However, it was later recognized that

students were able to generalize from these individual cases, comprehend, and then apply the underlying principles. In fact, the case method soon became very popular, and was in widespread use in American law schools by 1948 (1:34;2:17).

Although the case method is not used as widely in the teaching of business administration as it is in law, most of the prestigious schools of business administration use it to some extent (2:18). The Harvard Business School adapted the case method from the law curriculum and uses the method more than most other schools (1:38).

In the future, the case study method may find application in a broader spectrum of fields, such as psychology, behavioral sciences, and accounting (2:22). One variant of the case study, the "incident process" (which is a very short description of an actual event involving conflict within an organization), has been widely adopted in the field of organizational psychology. This method has found general use as a means of teaching other psychological principles (2:22).

The case method has become so ubiquitous because of the unique advantages it has when used in conjunction with the traditional lecture-oriented method of instruction. The lecture method is generally used to present ideas, principles, and tools; it is the student's responsibility to mentally file these concepts, and recall them when needed

for application (either on an examination or an actual situation).

Unfortunately, as with other skills, that which is seldom practiced is often forgotten. The analysis of a case study allows skills to be practiced as they are learned. In this analysis, the student's role has changed from a passive role of absorbing and reflecting upon theory, to an active role of drawing upon past knowledge and skills, and then applying them in a new situation.

The case method simulates the activity of the real world, as a student seeks out information, analyzes the problem, and then applies judgement to alternative solutions. Since this is done in a simulated environment, the student is free to explore the widest range of solutions, some of which may be appropriate for the case under study, and some of which may not, but the process of generating and evaluating alternatives will then be a familiar one when the student actually becomes a practitioner.

STATEMENT OF THE PROBLEM

The Air Force Institute of Technology (AFIT) has developed a course to fulfill the need for increased education in the middle management area. This course, SYS-480 "Intermediate Program Management", presents, via seminar elements of General Systems Theory, Management

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Theory, and the Air Force policies which are applicable at the middle management level.

In the development of this course, a case study analysis is planned as a way of showing how the theory might be applied in an actual situation. However, because of the unique perspective of this course (the military acquisition organization), there were no case studies presently available which would adequately allow application of the theory and principles presented in this course.

OBJECTIVES OF THE RESEARCH

There were two major objectives of this research:

a. Preparation of a case study, with discussion questions, adequate for use in the SYS-400 course. This case study was to be strictly descriptive in nature, and should deal with the middle manager's perspective within an Air Force acquisition program. Due to time and TDY constraints, the Avionics and Aircraft Accessories SPO, part of the Aeronautical Systems Division (ASD) located at Wright-Patterson AFB, OH, was used.

b. Analysis and evaluation of the SPO against management theory. This analysis will not be presented directly to the SYS-400 class, but will be used as an example of one analysis of the case study.

METHODOLOGY

Data for the first subobjective (the actual case study) was collected by interviews with ASD/AEA personnel

and a review of ASD/AEA documents. A total of 27 interviews were conducted; five were with middle or upper management personnel, 14 with program managers, and eight with other support personnel, either collocated in the SPO or dedicated to one of the SPO's programs. The interviews was structured as a guided discussion, and lasted only 20 minutes so as to disrupt the daily work as little as possible. Follow-up interviews were kept to a minimum for the same reason. A list of key documents which were reviewed follows:

      a. Program Management Plan

      b. Program Management Directives and Air Force Systems Command Form 56s

      c. Organizational Charts

      d. File Plans

      e. Funding Documents

      f. Organization contracts

      g. ASD policy letters

      h. Air Force Acquisition Logistics Division (AFALD) policy letters

      i. Program Management Responsibility Transfer (PMRT) documents

      j. Internal and external Program Review documents

      k. SPO Operating Instructions (OI)

The second subobjective of the research (the analysis of the case study) was accomplished by an extensive examination of the available management literature and the

applicable Air Force regulations. The general precepts and guidance found in this literature were used as standards for comparison in analyzing the SPO as it is presented in the case study.

OUTLINE OF THE THESIS

The case study, which is presented in Chapter 2, consists of four sections. The first section contains a broad overview of the policies and general operations of the Avionics and Aircraft Accessories SPO, ASD/AEA. The second section covers a single program within the SPO, the Standard Aircraft Sensor Unit, during the initial stages of production. The third section is a short glossary of some of the uncommon or unique terms used in the case, and the fourth section is a list of discussion questions for use in analyzing the case.

Chapter 3 is an analysis of the case, considering the four main factors which seem to have affected the management of the Avionics SPO and the Standard ASU program.

Chapter 4 consists of some general conclusions and recommendations for use of this case study, and other case studies which may be written for AFIT in the future.

CHAPTER 2

CASE STUDY

DISCLAIMER

The following case study, while based on facts, is not intended to accurately portray actual people, programs, or events.

SECTION I

THE AVIONICS AND AIRCRAFT ACCESSORIES SYSTEM PROGRAM OFFICE

ORGANIZATION

This case study is written about an acquisition System Program Office (SPO) at the Aeronautical Systems Division (ASD). The Avionics and Aircraft Accessories SPO (ASD/AEA) is one of the smaller SPOs at ASD, and handles a wide variety of small programs. (SPOs like this are usually referred to as "basket" SPOs.) Because of the size of the SPO and the nature of the programs it manages, it is a relatively permanent organization at ASD. Also, the way that the Deputy for Aeronautical Equipment (ASD/AE) is organized and managed is different from other SPOs because of the relatively small size of its programs, and the fact that it is a relatively permanent organization.

ASD/AEA is one of 11 organizations which make up ASD/AE. Four of these organizations have a direct acquisition responsibility and have the title of SPO; the remaining seven all have functional responsibility within their respective areas and are referred to as Directorates. (See Figure 1 for a breakout of the SPOs and Directorates and their areas of responsibility.)

ASD/AEA itself is organized as five separate divisions and a Management Operations Office. Three of these (the Mechanical Systems Division, the Communications Systems Division, and the Navigation Systems Division) have direct

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                    │                     │
                    │ Deputy for          │
                    │ Aeronautical Equipment │
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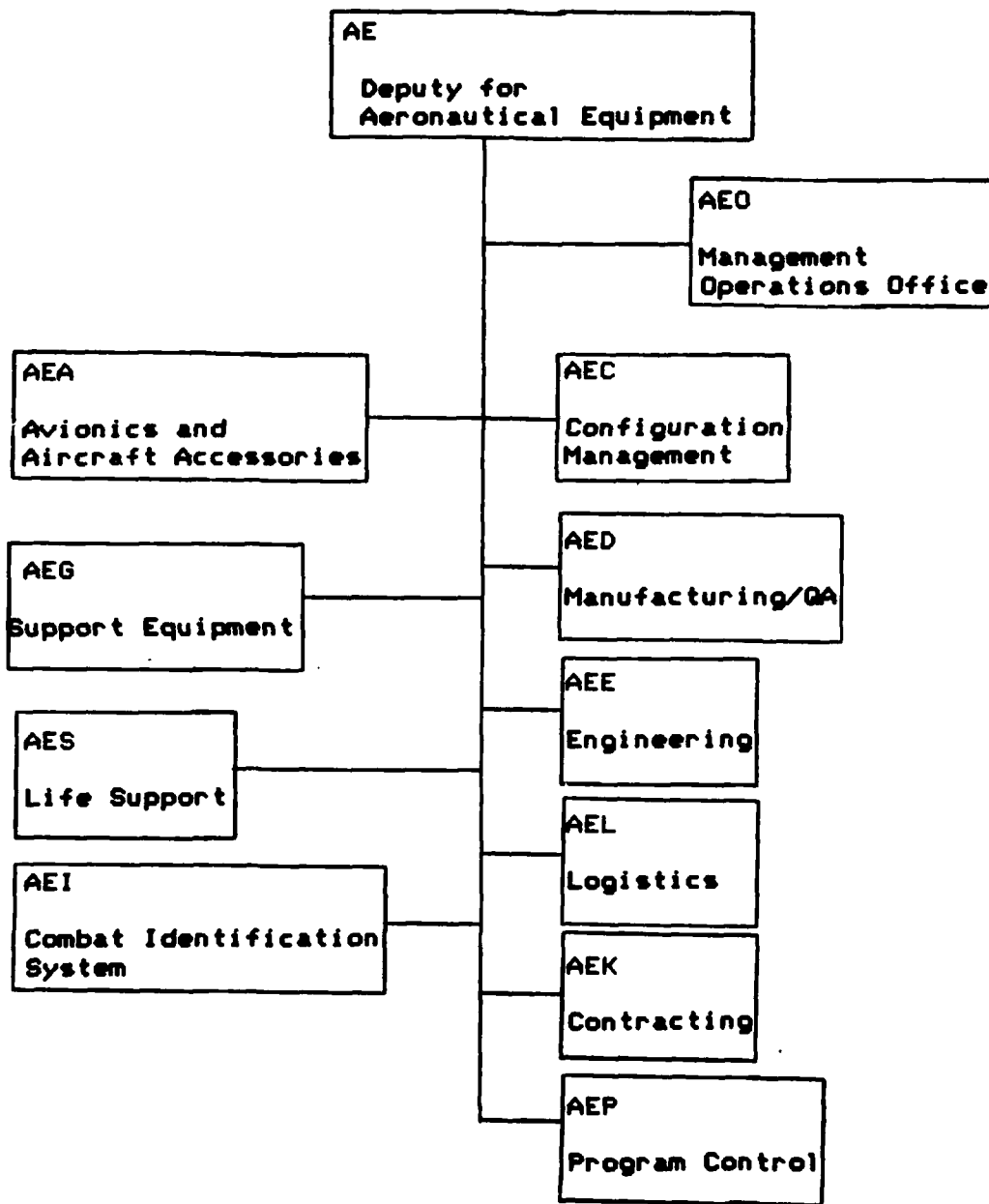
SPOs   Directorates

Figure 1

ASD/AE Organization Chart

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acquisition responsibility. The Logistics Division, although nominally part of AEA, consists of logistics functional specialists, whose reporting channel and responsibility run up through their functional organization, the Air Force Acquisition Logistics Division (AFALD). Similarly, the Contracting Division consists of Contracting Officers (CO) and Buyers reporting and responsible through ASD Contracting and Manufacturing (ASD/PM) channels. (See Figure 2.)

MISSION

The general mission of AEA is to develop and acquire various aircraft subsystems, primarily (as the name of the SPO would imply) avionics but also other types of equipment. In order to do this, personnel resources, financial resources, and authority are required. These are used to develop program teams which manage: (a) contracts with industry, (b) test programs with both industry and other DOD organizations, (c) aircraft production or modification programs with both industry and other DOD organizations, and (d) study programs with industry, other SPOs, and other DOD organizations. The equipment acquired by AEA program teams is usually provided as Government Furnished Equipment (GFE) to other ASD SPOs or to an aircraft System Manager (SM) as part of an ongoing production or modification program. AEA has had very few programs which supplied equipment directly to a using command.
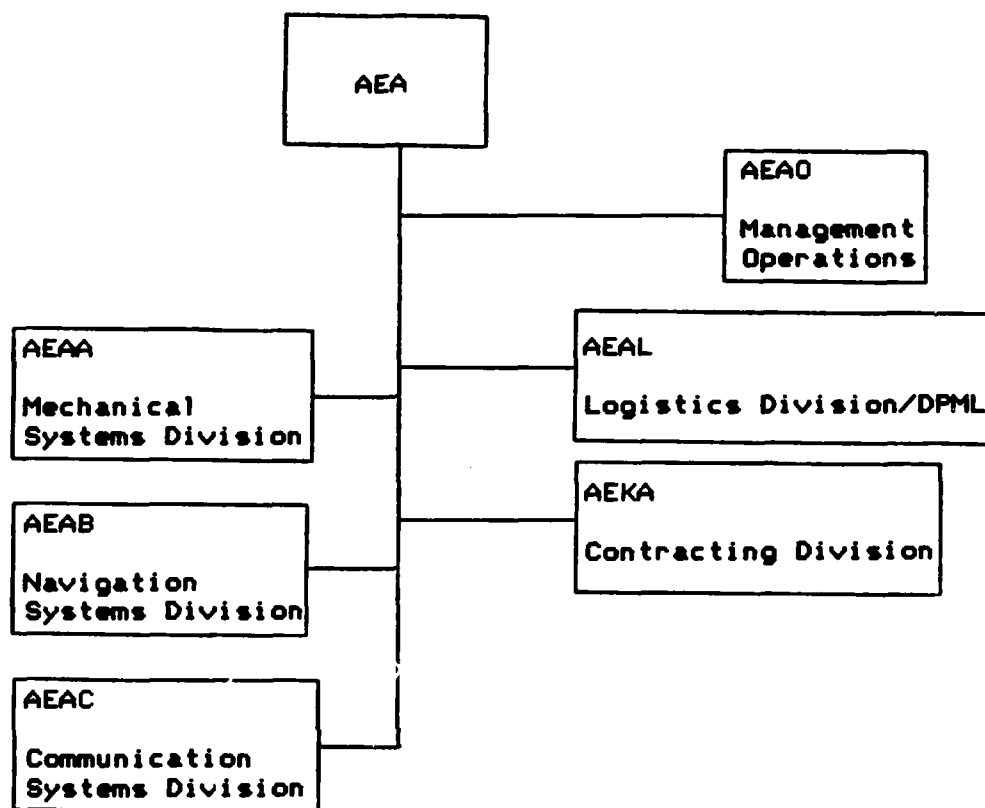
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  │ AEAB             │     │         │ AEKA                     │
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  │ Navigation       │     │         │ Contracting Division     │
  │ Systems Division │     │         └──────────────────────────┘
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  │ AEAC             │     │
  │                  ├─────┘
  │ Communication    │
  │ Systems Division │
  └──────────────────┘
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Figure 2

ASD/AEA Organiztion Chart

TERMINOLOGY

Several terms were used within AE to denote different levels of management. "Front Office" was used to denote the upper level management structure, while "Division Chief", "Branch Chief", or "Lead Program Manager" was used for middle management positions. (When two or more people with the title of program manager are assigned to a program, the person with primary responsibility is referred to as the lead program manager.) Middle management was defined as supervisory personnel with responsibility over first-line workers. Due to the peculiarities of the military acquisition organization, a clear distinction between middle and lower management is many times somewhat obscure with respect to delineation of specific responsibilities.

Air Force Regulation (AFR) 800-2 defines the term program manager as the single Air Force manager (System Program Director, Program/Project Manager, or System/Item Manager) during any specific phase of the acquisition life cycle. The program manager is the individual appointed by the Commander of AFSC or an Intermediate Command who has been delegated the authority and has the responsibility for the day-to-day management of the program.

ASD/AE is the program manager identified in the program direction, but in nearly all cases this responsibility has been delegated down to individual program

managers within the various SPOs. They act and are treated as the actual program managers on their programs.

SPO STRUCTURE

"Front Office"

Col. Anderson, the AEA SPO Director, is a command Navigator, with 27 years of experience in the Air Force, and 11 years in acquisition related positions. This is his third assignment as either Director or Deputy Director of a SPO. He has been the AEA SPO Director since January 1988. His last assignment prior to coming to ASD was as Chief of a Quality Engineering office within the Defense Logistics Agency.

Mr. Baker is the acting Deputy Director. (He normally holds the position of Chief, Mechanical Systems Division.) He has a total of 21 years of government service, 18 of which have been in acquisition, including 8 years at the Division Chief level or higher, and 5 years with AEA. Mr. Baker is a GS-14.

Mr. Carlson, a GS-15, is the current Chief Avionics Engineer (CAE). He has 17 years of engineering experience, 14 with the government and 3 with private industry. He has been the CAE for AEA since December 1988.

Navigation Systems Division

The Navigation Systems Division currently has responsibility for two programs, the Standard Aircraft Sensor Unit (ASU) Program and the Control/Display Unit (CDU)

for Standard ASU Program. The Standard ASU program will be the focus of this case study.

The Standard ASU Program is a significant and highly visible Air Force standardization program designed to develop and produce an ASU which has a standard interface and could be used on a variety of aircraft. Production units of the Standard ASU have been supplied as Government Furnished Equipment (GFE) to the A-10 and other programs. The total dollar value of the Standard ASU production program is over $100 million. Although management of the standardization program will remain with the acquisition organization (ASD/AEAB), the responsibility for the present contract and any follow-on contracts will be transferred to the Item Manager (IM) at Oklahoma City Air Logistics Center (OC-ALC) in November 1982.

Maj. (Lt. Col. selectee) Edwards is the lead program manager on the Standard ASU program. In addition, he has the title and duty of Chief, Navigation Systems Division. Maj. Edwards is a graduate of the Defense Systems Management College and holds a M.S. degree in Logistics Management from AFIT in addition to his 14 years of experience in logistics. This is his first assignment in acquisition management; he has responsibility for five people under him on this program.

Maj. Fulton is responsible for managing the Reliability Improvement Warranty (RIW) program under which

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the contractor provides support and maintenance for the current production units. Also, as part of the RIW, the contractor has guaranteed a growth in the reliability of the ASU from 275 hours mean time between failure (MTBF) to 525 hours MTBF. Management of this warranty involves daily contact with the contractor, the IM at OC-ALC, the A-10 System Manager (SM) at Sacramento Air Logistics Center (SM-ALC), and A-10 maintenance personnel at seven separate locations world-wide.

Capt. Graham handles the day-to-day program activities, coordination, and communication with both the Standard ASU contractor and the customer SPOs.

Both Maj. Fulton and Capt. Graham have the duty title of program manager; for both this is their initial acquisition assignment following several years of operational experience.

Engineering support for the Standard ASU program consists of a GS-13 civilian, Mr. Hampton, and a Canadian exchange officer, Maj. Ingram. Mr. Hampton is collocated from ASD/EN into the Deputy for Aeronautical Equipment Engineering Directorate (ASD/AEE), and is assigned from there into AEA. Mr. Hampton has a total of 27 years of government service--14 years as an Air Force navigator, and 13 years of Civil Service engineering experience. Maj. Ingram remains assigned to his home office, ASD/ENACN, and is dedicated to the Standard ASU Program. Maj. Ingram has

been with the program for the last year, and has 22 years of operational experience in the Canadian Forces. (Maj. Ingram's predecessor in this exchange position also served as an engineer on this program.)

The fifth person that works full time on the Standard ASU program is Mr. Franklin, a civilian contractor, who provides computer software configuration management support.

Support for normal configuration management is provided by Mr. Jefferson, who is assigned and physically located within AEC. Mr. Jefferson also supports 22 other programs within AE.

Financial management (program control) support is provided by Ms. Hanaford, who is assigned to and located in AEP. Ms. Hanaford has financial management responsibility for all programs within AEA.

For contracting support, Maj. Edwards must rely on Mr. Kenton from AEKA. Mr. Kenton must divide his time among this and three other programs.

In comparison, the Control/Display Unit (CDU) for Standard ASU Program (which Maj. Edwards has responsibility for as Division Chief) is much smaller, and has only two full time people assigned to it, the program manager, 1st Lt. Johnson and the program engineer, 1st Lt. Kline. This is the initial assignment for both. Lt. Kline is collocated from the same office and in the same manner as Mr. Hampton.

This program is supported by the same personnel who support the Standard ASU program in the areas of configuration management, financial management, and contracting.

Communications Systems Division

The Communications Systems Division has responsibility for six radio and Identification, Friend or Foe (IFF) programs, three of which have at least some development/test effort as well as production.

The division consists of a Division Chief, six program managers, and three collocated engineers.

Mechanical Systems Division

The Mechanical Systems Division is significantly different from the other two divisions in terms of size and number of programs. Whereas AEAB is responsible for developing and producting two large programs, and AEAC similarly has five large programs, AEAA has 23 smaller programs. Most of these programs are production efforts for equipment which had previously been bought as Contractor Furnished Equipment (CFE) and is now acquired by the government as GFE.

In addition to the Division Chief, there are six program managers assigned to this division. There are no collocated engineers; engineering support for these programs is provided by the customer SPOs.

PERSONNEL AND SUPPORT

Program Management

Col. Anderson relies on the personnel system to obtain new or replacement program managers for AEA. As the system now works, people are assigned by ASD Personnel (ASD/DP) to AE, and then from AE to the individual SPOs according to the priority perceived at the AE level. Col. Anderson feels that this approach has generally worked well. Occasionally, people within the SPO have identified other people with an interest in working in the acquisition field, or coming to work in AEA, and Col. Anderson has made an effort to "work the system" to get these people into the SPO. Often, these people are more highly motivated, and generally more capable than those obtained through the normal personnel channels.

Engineering Support

The engineering support for all of ASD comes from the ASD Deputy for Engineering, ASD/EN. The lines of responsibility descend from ASD/EN through ASD/AEE, the Aeronautical Equipment Engineering Directorate, to the Chief Avionics Engineer (CAE) for AEA, Mr. Carlson.

Col. Anderson must rely upon Mr. Carlson to obtain engineering support for his programs. Mr. Carlson, in turn, cannot request support directly from the appropriate ASD/EN organization, but must work through AEE.

Mr. Carlson is the reporting official for only one
engineer collocated in AEA; the remaining collocated
engineers report through AEEA, the Avionics Engineering
Division. The remaining (dedicated) engineers report
through their home offices in ASD/EN. Due to the general
shortfall of engineers within ASD, program managers are
frequently unable to obtain the amount of support, or the
specific engineer that they would desire.

The program managers (at all levels within the SPO)
generally felt that since the engineering support is
"matrixed" into the program offices rather than actually
assigned to and reporting through the SPO, the engineers are
not as responsive to the program manager as they should be,
but there is little they can do to change this. They
recognized that usually this is not the fault of the
individual engineer, but rather it is the way that the
system is organized that is at fault.

A collocated engineer must be responsive to four
different people: (a) the program manager, who has overall
responsibility for the program; (b) the CAE, responsible for
all engineering matters within the SPO; (c) the functional
division chief within AEE (usually the Chief of AEEA, the
Avionics Engineering Division), because the functional
division chief has responsibility for that particular
function within the Deputy and is also the engineer's
reporting official; and (d) the chief of the engineer's home

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office, since that office is responsible for his career
development and personnel records. Even though he is
assigned to a specific program, any of the other three may
occasionally task him with other work.

Logistics

Logistics Management support is obtained from the
Air Force Acquisition Logistics Division (AFALD). AFALD is
organized along parallel lines with ASD, so that ASD/AE has
it's own Logistics Directorate, AEL. The Logistics
Directorate consists of four divisions, each of which are
physically located within the AE SPOs. These divisions are
"double-listed" in that they use the AE designation as their
actual organization and mailing address, but the
responsibility and reporting channels are through AEL's
functional designation, AFALD/SDE.

To obtain support for programs within AEA, Col.
Anderson must make his request through his counterpart at
AEL, Col. Canton. Col. Canton then tasks the Deputy Program
Manager for Logisitics (DPML) for AEA, who is also Chief of
the AEA Logistics Division, AEAL, to identify the specific
person who will act as the logistics manager for the
program. Usually this is done informally between the three-
letter directors and the program personnel and then followed
up with a formal letter of request and response.

Logistics support is provided in a significantly
different manner from the way engineering support is

provided. The engineers are assigned to one program, and
are not necessarily assigned to a Division within AEA. All
of the logistics support is provided out of AEAL, with each
logistics manager having responsibility for several
programs. (There are only six people to work the 27
programs which require logistics support.) An additional
difference is that each logistics manager, in addition to
being part of a program team, also "back-stops" the other
logistics managers within AEAL, so that the "team concept"
is carried through in this functional area as well as within
the various programs. In this way, the logistics functions
can be supported even if the primary person is absent due to
leave or TDY.

Contracting

The Contracting organization is similar to
Logistics, except that the "home office" is another ASD
organization, the Deputy for Contracting and Manufacturing,
ASD/PM. The collocated organizations are ASD/AEK, and
ASD/AEKA. Requests for additional contracting support are
handled in the same way as requests for Logistics support.

The Contracts Division itself is organized into
three branches; one for each of the "product" divisions of
AEA. Although few programs have more than one Contracting
Officer (CO) or Buyer assigned to them, the branch chief
serves as a backup for all of the personnel in his section,

so that programs can be supported even if the CO or Buyer is absent.

Program Control

Program Control consists of several functions, but there are essentially only two which are provided to AEA, those of financial management and cost analysis. These functions are provided by AEP, which is manned by personnel from the ASD Comptroller, ASD/AC. Again, as in the case of Logistics and Contracting, functional responsibility and reporting remain with the functional channels, even though it is an AE organization. AEP is physically separated from the SPOs it supports.

All financial management support for AEA is handled by one person within AEP. She is responsible for 27 programs, although only four of these programs require a significant amount of attention. The workload for GFE breakout programs (equipment previously acquired by a prime contractor and now acquired by the government) and programs which have transitioned into full production is minimal. These programs usually involve only tracking total dollar amounts for reporting to AE, and preparation of the Program Objective Memorandum (POM) and Budget Estimate Submission (BES) packages. Research and Development (R&D) programs require the most effort, and she attempts to contact the responsible program manager several times each week to stay abreast of possible contracting or financial requirements.

Cost Analysis, the other function provided Program Control, is handled by a separate group within AEP, and is run more or less on a consulting basis, usually only in response to a request for support of a source selection or special study being performed by the program manager. This is handled directly between the program manager and the cost analysis section, with very little involvement by the three-letter chiefs.

Configuration Management

Support for configuration and data management is provided by AEC, although there are really only two people who support all the programs within AEA. They are occasionally augmented if a program is involved in processing a RFP or is in a source selection. Other than these, programs in the development phase or the initial production phase have the highest workload. Routine configuration management support consists primarily of processing Engineering Change Proposals (ECP) and planning and conducting Physical and Functional Configuration Audits (PCA/FCA). Support for new programs is handled by formally naming one of these two people as the Configuration Management focal point.

Manufacturing / QA

The Manufacturing and Quality Assurance functions, along with Reliability and Maintainability Engineering, are handled by AED. Support in these areas is usually provided

on a consultant basis, although some of the larger programs are assigned a specific person on a long term basis. Requests from a program manager for additional support are usually handled by the program engineer if a manufacturing point of contact has not yet been assigned. The SPO Director rarely gets involved; most of the contact between AEA and AED is between the program manager and the Manufacturing specialist.

TRAINING

Col. Anderson and Mr. Baker agree that the ideal training for a new program manager would be to work with an experienced program manager for nine months to a year. During this time the new manager would essentially be doing the "gopher" work and gaining experience on the daily activities and decisions of a program manager. In addition, the new manager would be required to complete a mandatory reading list and attend the series of short courses presented by various functional branches of AE. The mandatory reading list involves approximately fifty documents and consists primarily of the AE Operating Instructions (OI), the 800 series of directives (both Air Force and Air Force Systems Command), and various pamphlets and handbooks which have been developed by the supporting functional offices within AFSC and ASD for use by acquisition managers. Short courses are presented once each month, lasting approximately three hours, and usually cover

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topics such as Technical Order Acquisition (which would probably be presented by a joint team from Logistics and Data/Configuration Management), the Cost/Schedule Control Systems Criteria (presented by Program Control), or Combined Environments Reliability Testing (presented by Engineering). Also as part of this ideal training program, after this initial familiarization and "apprenticeship", the program manager would attend the AFIT SYS 100 "Introduction to Acquisition Management" and SYS 200 "Acquisition Planning and Analysis" courses (or other formal training programs) and upon completion he would be given his own program.

Mr. Baker has identified several factors which keep this ideal training program from occuring. First of all, there are too many programs to spare a new program manager to first serve on another program before taking on one of his own. Second, because of the time it takes away from doing the job, new people rarely complete the reading list in the first nine months on the job. Third, the AE short courses are widely perceived as being useful for a person with experience, but nearly worthless as a means of introducing new personnel to a topic. Part of the problem is that these courses are taught by functional specialists and not trained instructors; many new program managers are overwhelmed by the overuse of acronyms and buzzwords. And finally, it is not always possible to schedule attendance at the formal training when it would be most beneficial;

instead, sometimes people are sent to these courses when a vacancy exists. Because of this, some people have been sent within six weeks of arrival, and some have waited as long as five years before attending such formal training. Both the program managers and Col. Anderson feel that the training is wasted in both cases.

COMMUNICATIONS

Col. Anderson and all of his Division Chiefs have given almost complete freedom to the SPO personnel to talk informally with anyone that they feel is necessary to accomplish their work. This has been done for three reasons. First, the volume of information that a program manager needs far exceeds what they consider a normal person to be able to read and digest during the normal workday. They feel that a short conversation with the right person can get the needed information more quickly than attempting to find the appropriate paragraph in some report. Second (and related to the first point), they think that one can get the information much faster, and much clearer from a short conversation or meeting directly with the right person than if it must first filter up one chain of command and then down another. Third, the Direct‹. and Division Chiefs believe that they are busy enough without attempting to be the "go-between" on each issue for every program manager.

There are only two restrictions that have been levied on the program managers. They are to inform the

Director or Division Chiefs if the program manager has discussed something with someone above them in the chain of command (this usually happens when Col. Anderson stops someone in the hall, or when he needs a quick answer or response and talks directly with the program manager). They also ask that people respect the chain of command in other organizations that they deal with, talking first to their counterparts within the other organizations, and relying upon them to inform anyone above the program manager level.

These restrictions are recognized by all as simply being common sense and courtesy, and have not impeded them to any great extent. Col. Anderson has found that this open communication has a benefit beyond the efficient management of the programs under him; the program managers are as open with him as they are with anyone else, and he feels that he gets better answers to his questions as well.

There are two formal channels of communication within the SPO: the coordination of written correspondence, and a monthly briefing known as the Three-letter Organization Program Review (TOPR).

All correspondence (other than that which is going to a contractor) is signed out at the Division Chief level or higher. This gives the Division Chief an opportunity to review the correspondence and provide his approval (by signing it) or disapproval (by sending it back to the program manager for revision). The Division Chief can also

review the previous coordination, and send it back for additional coordination if he thinks that the right people have not seen it and provided their concurrence. Correspondence which is being sent to a contractor is required by the Defense Acquisition Regulations (DAR) to be signed out by the contracting officer. However, the Division Chief's coordination is required before a letter is given to the contracting officer for signature, so he has essentially the same opportunity for review and approval.

The TOPR is presented to Col. Anderson by each division once every month. These reviews are scheduled for the first, second, and third Tuesdays of the month. Although the briefing is formally given to Col. Anderson, the Deputy Director, the Chief Avionics Engineer, the Chiefs of the Logistics and Contracting Divisions, and a representative from AE (usually the Assistant Deputy) also attend. This briefing presents (using standardized charts) the major program events or accomplishments which occurred during th; last 30 days or are scheduled to occur during the next 90 days, any outstanding program issues, and an overall assessment of the program status. This briefing provides Col. Anderson with an opportunity to review each program every month, and to provide direction or push for additional support if it is needed. It is also the only time that Mr. Carlson gets any formal feedback on the workload and the issues faced by the engineers working under him.

DECISION MAKING POLICY

The delegation of authority within AEA has allowed flexibility and diversity, which in turn permitted effective use of all SPO personnel. It should be noted that by regulation only the program manager can be held responsible for the actions within an organization. In AEA the responsibility for making decisions is dispersed to program managers at all levels.

The level at which a decision is made depends upon the funds requirement, political impact, and level of support contributed by other external organizations. Normally, the individual program managers make all of the decisions on their programs. When a decision involves obtaining additional support, basic policy or direction, a controversial position, significant changes in the program schedule or objectives, or if it will affect another SPO's plans, the program manager will elevate the decision to the next higher level, the Division Chief. This is done because the program manager does not have authority in these areas, or feels that the higher rank of the Division Chief may make the decision easier to enforce.

Nearly all of the program related issues which have been elevated are decided by the Division Chief. Although he does not have the authority to directly task other organizations, his position and rank often make it possible to work out support problems or differences with other SPOs.

However, only a small amount of the decisions have issues requiring resolution at an upper level.

The SPO Director (or the Deputy Director) ccould go to other organizations and directly request support for his programs, and can discuss issues at a high level with other SPOs, the decisions in these areas usually come to him for resolution. Policy decisions, which could impact how other SPOs manage their programs, decisions on whether to accept new work, and decisions which by their nature must be made at higher levels (such as program funding, or distribution of discretionary funds) are elevated up to AE, but of the issues raised from within the SPO, only a moderately small amount need to be elevated for decision.

An integral part of the decision-making process is the program team. The team is headed by the program manager and includes specialists from each of the functional disciplines. The program manager acts as the hub for each of the spokes of the functional areas. This team concept allows information from all areas to be evaluated and integrated, into a sound decision, and necessary issues to be addressed from all aspects of a decision.

Even though middle management is not a direct participant in the team, their inputs are made by the program manager, and their influence is felt when decisions are coordinated up the chain of command. This middle management influence is exhibited heavily in the formation

of plans and strategies.   Also, this influence is perceived

in the setting of priorities.

SECTION II

THE STANDARD AIRCRAFT SENSOR UNIT PROGRAM

BACKGROUND

The background section is in three parts. The first part describes the origin of the Standard Aircraft Sensor Unit program, and the development/test program. The second details the requirements of the production contract, and the third part gives the schedule requirements of the first program to use the Standard ASU, the A-10 Advanced Avionics System program.

Development Program

The Standard Aircraft Sensor Unit (ASU) program was a significant standardization effort which began in the early 1970's, when the USAF began to express concern over the growing proliferation of unique aircraft sensor systems. At that time, there were 27 different systems in the inventory. Most of these systems fall into the medium accuracy class and were suitable for most tactical or general purpose aircraft. The intent of the Standard ASU program was to stop proliferation of medium accuracy systems and lower acquisition and life cycle costs by fostering competition in the sensor industry, increasing reliability, and promoting equipment interchangeability.

Work began in 1974 on the development of a form, fit and function specification for a Standard ASU. A special team of government and industry engineers wrote the

specification, which was based to a great extent on the specification for the F-16 ASU.

Until the formal program direction was issued, the engineering development of the specification and a test plan were the only activities on the program.

Program direction was issued in December 1976 to establish a competitive program for the development of the Standard ASU, using the form, fit, and function specification. The Program Management Directive (PMD) required the Standard ASU to be interchangeable with the F-16 ASU and to use a MIL-STD-1553A multiplex data bus interface. The direction also required AEA to develop a business strategy for the production program for approval by the AFSC commander.

A Request for Proposal (RFP) was released in March 1977, and it required potential offerors to submit potential ASU hardware for screening flight tests at the Central Sensor and Guidance Test Facility (CSGTF), Holloman AFB, NM. The results of these screening tests were to be used as part of the development program source selection. Although the Air Force desired to qualify as many sources as possible, if funds were not available to award contracts to all potential development contractors, technical excellence was one of the source selection factors. Three contractors responded to the RFP and submitted hardware for evaluation.

The development program source selection was held May-July 1977. Just prior to contract award, funding was deleted by congressional action, delaying the program for nearly one year. By direction of Col. Anderson's predecessor, no additional planning or other work was done during this period.

Funds were restored and the source selection process was restarted in May 1978. Source selection was completed and contracts were awarded to Westech Inc., American Avionics Corp., and The Control Systems Company on 20 June 1978.

These contracts required each contractor to design, develop, and fabricate four aircraft sensor systems, consisting of four Line Replaceable Units (LRU): (a) ASU, (b) Control and Display Unit (CDU), (c) ASU mount and (d) ASU battery. Support for an extensive test program was also required. No support equipment was developed or acquired under the development contracts; the contractors were responsible for all maintenance on their equipment.

Four separate organizations were involved in the test effort. Laboratory performance tests, flight performance tests, and environmental qualification tests were performed at the CSGTF. A-10 integration and flight test were conducted by the Air Force Flight Test Center (AFFTC), Edwards AFB, CA. F-16 compatibility testing was accomplished by General Dynamics, Ft. Worth, TX, in the F-16

Systems Integration Laboratory (SIL). Multiplex data bus compliance testing was performed by ASD/EN personnel in the Systems Engineering Avionics Facility (SEAFAC) at Wright-Patterson AFB, OH.

In addition to the government conducted tests, the ASU contractors performed safety-of-flight tests, Production Verification Tests (PVT), and a maintainability demonstration. (The PVT will be described in greater detail in the production program section.)

As a result of late hardware deliveries from all three contractors and failures experienced during testing, development testing extended beyond the planned completion date. Some tests were performed concurrently with the production source selection which took place from 22 October 1979 to 31 January 1980; however, enough data was gathered to support a source selection decision.

The award of the production contract was based on an integrated assessment by the source selection authority (the ASD Commander) of the production proposals, development test results, and the results of a Production Readiness Review (PRR) held at each contractor's facility during the source selection. Given that the minimum technical requirements were met, the considerations--in order of importance--were (a) life cycle cost, (b) technical excellence, and (c) management/manufacturing capability.

On 31 January 1980, a $33.7 million firm, fixed price (FFP) contract was awarded to Westech Systems, Inc., for 237 ASUs, with FFP options for up to 1922 additional units. Ten of the ASUs bought under the basic contract were acquired for an Army development program. The contract also included a five year Reliability Improvement Warranty (RIW) which required Westech to provide all of the Intermediate and Depot level maintenance, and improve the reliability of the ASU from 275 hours mean time between failure (MTBF) to 525 hours MTBF. There were monetary and other penalties if Westech failed to meet this reliabiltiy growth.

Production Program

The production delivery schedule called for delivery of ASUs beginning in October 1980. The first five units (three for the Air Force to be delivered in October and two more for the Army in November) were to be delivered without going through the Production Verification Testing (PVT) which was required on the remaining deliveries. The three Air Force units were to used for the start of the A-10 Follow-on Operational Test and Evaluation (FOT&E) (see the A-10 Requirements section); the two Army units were for development and integration testing.

Initial delivery of A-10 operational units was to begin with three ASUs in December 1980, with a gradual increase in the delivery to a peak of 40 units per month in March 1982. The deliveries would continue at 40 units per

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month for three months, and then gradually decline, with final delivery in April 1984.

Maj. Edwards recognized from the very start of the program that he had an ambitious schedule. The bidders were given an opportunity during source selection to optimize the delivery schedule with first delivery anywhere from nine months to fifteen months after contract award. Westech chose to stay with their original schedule of nine months to first delivery. This schedule was incorporated into the production contract.

There were two factors which made this a difficult schedule. First, the change from the development configuration to the production configuration required Westech to integrate two separate system software packages into a single module. Mr. Hampton and Maj. Edwards considered this to be a very challenging task. If the software integration was not done correctly, the units would not be usable in the A-18, and therefore Westech was required to verify the new software prior to acceptance of the first production unit. This verification was to be done at the SEAFAC; it was originally scheduled for 15 Jul 88- 1 Aug 88.

The second factor was the rigorous PVT which each ASU had to perform prior to delivery. PVT is a quality assurance test designed to eliminate "infant mortality" in the ASUs by discovering and eliminating all workmanship

problems before the unit left the contractor. The PVT
forces any marginal piece-parts or connections to fail by
first vibrating and then alternately cold-soaking and hot-
soaking the unit. The ASU had to undergo fifteen of the
temperature cycles as a failure-free loop before passing
this test. (The PVT was informally known as the "shake and
bake" test.) An ASU would generally have over 150 hours of
test time prior to delivery.

On this program, there was also a final acceptance
test (which is witnessed by on-site government personnel)
before the unit was accepted.

A-10 Requirements

The A-10 Advanced Avionics System (AAS) required
ASUs for essentially four activities: (a) the Follow-on
Operational Test and Evaluation (FOT&E) program,
(b) production line "slave" units, (c) units for production
aircraft installation, and (d) units for retrofit of
previously delivered aircraft.

The A-10 AAS break-in point was with production
aircraft number 431; three of the twelve aircraft
delivered in November 1988 would be the first to have the
AAS installed in the factory. (Delivery of AAS aircraft
would then continue at the normal rate of twelve each
month.) The first three aircraft with the AAS would then go
to Nellis AFB, NV to start the three month FOT&E.

It was recognized early in the program that delivery of ASUs with the full PVT to support the early portion of the A-18 schedule would be nearly impossible. For that reason Maj. Edwards planned the October ASU deliveries (three units) without PVT. These units would start the FOT&E and perform the initial portion of the test (evaluation of performance and development of operational tactics) and then be replaced with production units for the final portion of the test (evaluation of the system maintainability and reliability).

The ASU was only one of six components of the A-18 AAS. In order to check out the other AAS components prior to installation in the aircraft, the A-18 contractor, Fairchild Republic Corporation (FRC), needed ASUs for their test bench/hot mock-up which they used for incoming inspection of all AAS components. ASUs were also needed for verification of the aircraft wiring, and flight acceptance of aircraft. Production "slave" ASUs were to be used for these functions. The slave units would not be delivered with the aircraft; they would be removed and remain at the factory for inspection and acceptance of other components and aircraft.

Westech had indicated (even prior to release of the production RFP) that they would be unable to produce production configuration units early enough to support the "slave" requirements, and so an alternate method was found.

The development units from all three development contractors would be refurbished and updated to the production interface requirements. These units could be available early enough to perform as slave units until sufficient production units became available.

Until a large enough stock of ASUs had been delivered to permit continuous delivery of ASU-equipped aircraft, the AAS A-10s would be delivered without the ASU (the aircraft was still fully mission capable without the ASU installed), and then backfilled in the field. The first fully equipped aircraft was to be delivered in April 1981; backfill of the previously delivered aircraft would not be completed until September 1981.

Retrofit of over 400 aircraft that had already been delivered was to begin in July 1982 and would be completed in August 1984. The retrofit was to be done at the A-10 depot, the Sacramento Air Logistics Center (SM-ALC).

INITIAL SOFTWARE PROBLEMS

Slip in SEAFAC Testing

The Standard ASU program had difficulties from the very start. The two losing contractors, as Col. Anderson had anticipated, had apparently lost their interest in the program and had not given the the refurbishment program much priority. Maj. Edwards had had trouble in negotiating the supplemental agreements to the development contracts for the refurbishment effort and with delivery of units after the

agreements had been signed. For the first five months of the production program, the refurbishment program appeared to Col. Anderson to be the major problem on Standard ASU program, absorbing most of Maj. Edwards' time.

He was somewhat surprised when, at the July TOPR, Maj. Edwards told him that Westech had informed them the previous day that they would not be coming in to perform the SEAFAC testing during the next week as scheduled. Westech was now saying that there would be a four to six week delay before they would have their software development completed and ready for the verification test.

Col. Anderson queried the program engineers and found out that they had just discovered that Westech had missed their internal milestones all along. The technical problems that the engineers had known about had been minimized by Westech--they had been called "minor problems" which would be taken care of "in a few days"--but the truly significant problems had been complete surprises to the program team.

Col. Anderson asked what special effort Westech was doing to make up this slip, and Maj. Edwards assured him that Westech had put extra programmers on this effort and had gone to a two-shift operation. According to Maj. Edwards, Westech was expressing high confidence that they would complete the software development as now scheduled and would pass the SEAFAC test with no difficulties whatsoever.

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Maj. Edwards did not share this high confidence; he thought that there were probably other software problems that Westech had kept hidden.

Mr. Baker, the Chief Avionics Engineer, expressed his concern about the possible impact of this delay on delivery of the production units. According to Mr. Hampton, the completion of the software development was critical to the start of system test, but the hardware design, development, and test could continue without the complete production software. He stated that at this point the hardware design and build was really the pacing item.

Mr. Baker was still concerned about the potential delay in production deliveries, and told the Maj. Edwards and Mr. Hampton that they should give this area close attention during the next few weeks.

Col. Anderson agreed, but he was also concerned that this problem had gone undetected until now.

AFA Action

Col. Anderson told Maj. Edwards that he had had similar communication problems between contractors and the government on other programs. He felt that this was a significant problem and some action should be taken on this prog. ... to ensure that Westech would not hide such important information again.

Maj. Edwards was directed to prepare a letter for Col. Anderson's signature expressing his concern over the

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schedule slip and the fact that Westech had not informed anyone of the severity of the slip until now. The letter was also to ask for Westech's recovery schedule for the software development. The letter would be sent to Col. Anderson's equivalent, the program director at Westech.

Col. Anderson asked the Chief of the Contracting Division, Mr. Smith, (who was in attendance at the TOPR and had heard all of the discussion) whether he had any objection from a contracting viewpoint on this approach. Mr. Smith said that as long as the letter went through program management channels both here and at Westech, he had no objections to this approach. He did ask for the opportunity to coordinate on the letter before it went out. The letter was prepared and sent the next day.

The Westech program director, Mr. Akrin, called Col. Anderson one week after the letter had been sent. Mr. Akrin told Col. Anderson essentially what Col. Anderson had heard from his own people at the TOPR. Westech had taken programmers off other programs and had been working all of them on two shifts in order to ensure that the software development would be completed as now scheduled. He assured Col. Anderson that Westech was giving this program top priority and that the company would make every effort to meet the ASU delivery schedule.

Col. Anderson thanked Mr. Akrin for his call, and asked that there be closer communication between Mr.

Akrin's people and his on the program status from this point
on. Mr. Akrin assured him that there would be. This
concluded the conversation.

INITIAL DELIVERY PROBLEMS

Software Problems

The extra programmers that Westech had put on this
program did not quickly solve the software problems. For
the three months following the July TOPR, Col. Anderson
heard a series of Westech software problems and get-well
schedules. It seemed to him that Maj. Edwards was doing all
that he could to ensure that the government was not impeding
Westech's progress. The only potential hindrance that could
have affected Westech was the availability of the SEAFAC;
however, Maj. Edwards had made special arrangements with the
SEAFAC to accommodate Westech for retest each of the three
times that Westech had requested.

In early August, Maj. Edwards put together a team
consisting of the two program engineers, two additional
software engineers, and a software configuration management
specialist and held a special review at Westech. The
opinions of the team members varied considerably; some
thought that Westech could solve their problems and have the
development completed within a week, and others believed
that more than six weeks would be needed.

At the October TOPR, Maj. Edwards briefed that
Westech still believed that they would meet their optimistic

schedule, and deliver three ASUs at the end of the month. They had integrated four systems with the latest version of the software, and were informally performing the functional testing required for delivery.

Because of the importance of these three systems to the overall A-10 program, Col. Anderson told Maj. Edwards to give him a short status report at the end of each day until the end of the month. Col. Anderson also stated that, in his opinion, late delivery of working ASUs would be better than on-time deliveries of defective hardware. Maj. Edwards agreed, and said that this was what he had been telling the A-10 SPO all along.

With one week to go in the month, neither Col. Anderson or Maj. Edwards believed that Westech would be making their October deliveries on time. Westech was then in testing at the SEAFAC but could not pass the required tests. The four systems that they had integrated at the factory and had been testing were having problems with both the hardware and the functional performance.

Col. Anderson, following Maj. Edwards' suggestion, then called Mr. Akrin. Col. Anderson thought it would be best to go easy on Westech, taking the tone that everyone had known that it had been an ambitious schedule from the very beginning, and Westech had given it their best effort, but now he needed a realistic schedule of when Westech would

be finished with the software and would be in a position to deliver hardware.

Mr. Akrin said that he was not terribly upset about the software problems that they were experiencing. He expected them to be completely resolved within the next week, and although the three units scheduled for delivery at the end of the month would probably be late, he did not expect them to be more than one or two weeks late at the most. He was still confident that the November deliveries would be on time. Mr. Akrin told Col. Anderson that this program still had top priority at Westech and that he was personally involved with it on a daily basis. He offered to call Col. Anderson if anything happened which changed his assessment of the program status.

Col. Anderson accepted his offer, and reminded Mr. Akrin of the importance of this program to both the Avionics SPO and the A-10 SPO.

Production Verification Test Problems

By the time of the December TOPR, Westech had still not passed the SEAFAC testing, and the government had not yet accepted any units. However, the software problems that Westech had remaining did not affect the operation of the ASU in the A-10; the F-16 compatibility requirements were the only remaining problems.

In order to provide slave ASUs for the A-10 production line, Maj. Edwards had accepted Westech's offer

of four company-owned units. This not only supported the A-18 production line but also allowed Westech to test their solutions for the software problems in parallel on the A-18 and at the SEAFAC to ensure that they would not be creating one problem while they solved another.

This approach would also be taken with the first three units for PVT and A-18 installation; Westech would start the test with the software that would meet the A-18 requirements, and update the units when the final version of the software became available. This was to be done at no cost to the government, and Westech was to provide additional support for the A-18 production line and for the FOT&E as partial compensation for not meeting the software requirements at the time of delivery.

However, the December deliveries still had to pass the PVT, and it soon became apparent that Westech had not allowed sufficient time in their schedule to permit debugging of the ASUs during the initial PVT.

Westech had originally estimated that PVT would take approximately one week once they had the production line up and running. They had budgeted three weeks for the PVT on the initial three systems. The program office estimates for the initial PVT ranged from three to eight weeks, based on Westech's past performance in meeting their schedule, the experience with first PVT on other programs, and the fact

that the test equipment had not been fully checked out with the production configuration ASU.

One week before the scheduled delivery date, Maj. Edwards briefed Col. Anderson that, according to his conversations with the Westech program manager, Westech had experienced difficulties with PVT from the very start but had refused to revise either the test time or their projected delivery schedule. He stated that he was having a very difficult time doing any planning with the "rubber base line" that Westech was following.

He then detailed the times that Westech had notified him of late deliveries or major program problems only days before they would cause significant impact on the program. First, they had failed to advise him of missing the software development milestones until the week before the start of SEAFAC testing. Second, Support Equipment Requirement Documents (SERD) were delivered two weeks late with known omissions and errors, and now the problems with PVT on the first units.

Westech declined to update their planned delivery schedule, always pushing one month's late deliveries into the next month. It seemed to Maj. Edwards that Westech was not planning more than three weeks ahead; he was not sure that they would ever make production deliveries at the contractual rate unless they started to consider the

problems they were having now and changed their lead times
and monthly delivery quantities.

Maj. Edwards said that he felt it was now time to
get some upper management attention on the program.   Col.
Anderson agreed and said he would take it up with Col.
Smithson (the Deputy for Aeronautical Equipment, ASD/AE) at
the staff meeting the next day.

Involvement of the ASD Vice Commander

At the staff meeting, Col. Anderson discussed the
Standard ASU program problems with Col. Smithson.   Col.
Smithson agreed on the need for upper level management
involvement and had a recommended approach.

ASD had just undergone a change of Vice Commanders,
and the new Vice Commander, Maj. Gen. Jackson, would be
visiting a number of contractors as part of an introduction
and familiarization tour.

Col. Smithson would recommend that Maj. Gen. Jackson
include Westech as one of the contractors on this tour.
Col. Anderson agreed, and later notified Maj. Edwards of the
plan.

Two days later, Col. Anderson was notified that Maj.
Gen. Jackson had accepted Col. Smithson's recommendation. He
would be visiting the Westech facility where the ASUs were
built and discussing the program with the president of
Westech's Avionics Division.   Maj. Gen. Jackson wanted
either Maj. Edwards or Col. Anderson (or both) to be there.

Col. Anderson notified Maj. Edwards of Maj. Gen. Jackson's acceptance, and decided that Maj. Edwards alone would be attending, since he had the detailed knowledge of the program and the problems. He directed Maj. Edwards to prepare a background paper and a talking paper on the program for Maj. Gen. Jackson, and told Maj. Edwards to handle the rest of the details himself.

When Maj. Edwards returned from the trip, he briefed Col. Anderson on the meeting. The meeting had consisted only of Maj. Edwards, Maj. Gen. Jackson, Mr. Akrin, and the Westech Avionics Division president.

Maj. Gen. Jackson had emphasized the importance of the Standard ASU program both as a highly visible Air Force standardization program, and as the pacing item in the A-10 AAS program.

Westech's position was that everyone knew that this was an ambitious schedule, Westech had done all that could reasonably be expected of them, and that they had done their part in minimizing any impact to the A-10 program by providing company-owned units and additional support at both the A-10 production line and Nellis AFB for the FOT&E.

The Westech president again stated that this program had high visibility and priority within the company and received his attention on a monthly basis.

According to Maj. Edwards, the real information came after the meeting. In his discussions with the Westech

program manager, he was told that Westech, as a matter of corporate policy, operated on so-called 50% planning. If there was a 50% chance of meeting a certain date, that date became the officially scheduled date. This had been the company's policy for several years, and the Standard ASU program's series of schedule problems were not considered unusual at this company.

Col. Anderson asked if this new information had changed any of Maj. Edwards' delivery projections. Maj. Edwards said that he was still reviewing some data he had received from Westech at the meeting, but he did not expect there to be any change from his last estimate. He still expected delivery of the first three units to complete PVT sometime in late February, approximately six weeks after Westech's latest estimate.

Col. Anderson asked Maj. Edwards to write up his findings from the meeting and his informal discussions as a trip report for Col. Smithson, and to keep him informed.

Involvement of the ASD Commander

Maj. Gen. Jackson's report on the trip to Westech was sent to the ASD commander, Lt. Gen. Donaldson. Lt. Gen. Donaldson was very interested in the results of the discussions with Westech. Not only had he been the source selection authority on the standard ASU program, but he also had experience with Westech several years ago, when he was a Colonel and a SPO director, and had had similar problems

with trying to keep Westech on schedule. He sent a memo down to Col. Anderson stating that he wished to be kept informed on the program status; AEA should send him an informal memo every Friday.

Col. Anderson had Maj. Edwards write and sign the memos as the program manager. For three weeks the memos were returned without significant comments.

When Maj. Edwards reported that Westech had not delivered units in January (as they had told Maj. Gen. Jackson during his visit) and were now predicting first delivery in late February (as Maj. Edwards had been predicting all along), Lt. Gen. Donaldson sent his first responce to the memo. This one came back with the note: "Unacceptable- Prepare a letter to Joe C."

"Joe C." was Mr. Joseph Cantenzarro, whom Lt. Gen. Donaldson had dealt with when he had been a Colonel and a SPO director. Mr. Cantenzarro at that time had been a program manager with Westech, on a program that also had had significant schedule problems. Mr. Cantenzarro had also been promoted since that time and was now a vice-president with Westech's parent corporation.

Col. Anderson left the writing and staffing of the letter to Maj. Edwards. He saw it once in draft and saw no changes that he wished to make. The next time he saw it was when he coordinated on it on it's way up to Lt. Gen.

Donaldson.   The   letter   was coordinated up   the   chain   of
command and signed without change.

A few days later, Lt. Gen. Donaldson received a call
from Mr. Cantenzarro. He would be in Dayton during the next
week   to   attend a convention and wanted the opportunity   to
discuss   the   Standard   ASU   program   with   him.   Lt.   Gen.
Donaldson   accepted,   and after the meeting was arranged   he
called Col. Smithson and told him that he wanted either Col.
Anderson or Maj. Edwards at the meeting.   The decision was
left   up   to Col. Anderson,   and Col. Anderson   told   Maj.
Edwards to attend the meeting as the sole representative of
the program office.

Before   the meeting actually took   place,   Lt.   Gen.
Donaldson   asked Maj.   Edwards for an update on the program.
There had been no real change since the last memo. Lt. Gen.
Donaldson asked Maj. Edwards to hold any comments until the
end of the meeting.

Col.   Anderson learned from Maj. Edwards that it had
been a very short meeting with no real discussion. Lt. Gen.
Donaldson,   after the initial exchange of pleasantries,   had
only four comments. He told Mr. Cantenzarro that (a) he did
not believe anything that Westech had told him in the past,
(b)   he did not believe that they had any plans to abide by
the   contract   they had signed,   (c) they had   better   start
publishing realistic delivery schedules, and (d) if they did
not start delivering ASUs soon or they would never receive a

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contract from him again.   The meeting had terminated rather
abruptly at that point.

EPILOGUE/CONCLUSION

The meeting between Lt. Gen. Donaldson and Mr.
Cantenzarro proved to be the turning point in the Standard
ASU program.   Two weeks after the meeting, Westech finally
passed the SEAFAC tests, and three weeks later the first
unit completed the PVT.

Westech continued to have problems with deliveries,
never reaching the rates called for in the contract.   This
had no real impact to the program.   The rate of 40 units per
month had been driven by the simultaneous startup of the
A-10 retrofit program and the Army program.   The Army
program had been cancelled and the A-10 retrofit program had
been stretched out due to funding shortfalls several months
before the high rates of delivery were to occur.   The
Westech deliveries did keep up with the requirements the
program had after these adjustments.

There was no further involvement by any upper level
management.   Lt. Gen. Donaldson continued to received the
weekly memos until April 1981 and then stated that the
program appeared to be under control and that he had no
further need for the memos.

Col. Anderson also had little further involvement in
the program.   He has advised Maj. Edwards from time to time,
and reviewed the reorganization of the program when the Army

program and A-18 retrofit programs changed, but Maj. Edwards
has essentially handled the program by himself from that
point on.

SECTION III

TERMS AND DEFINITIONS

Acquisition- The process consisting of planning, designing, producing, and distributing a weapon system or equipment. Ends with delivery of the last article to the using organization. (AFP 800-7)

MIL-STD-1553A -A standardized interface and protocol to allow digital communication between any number of compatible pieces of equipment. Also known as a multiplexed data bus.

Procurement- The process of obtaining personnel, services, supplies, and equipment. (DOD 5000.8)

Production Verification Test (PVT)- A three-part test required before contractual delivery of equipment. Consists of random vibration, fifteen cycles of temperature cycling, and a through final functional test.

Program Management Directive (PMD)- The official HQ USAF document used to provide direction and guidance to the implementing, participating, supporting, and operating commands to satisfy documentation requirements. (AFR 70-59)

Program Management Responsibility Transfer (PMRT)- The transfer of program management responsibility for a system (by series) or equipment (by designation) from the implementing command to the supporting

command. PMRT includes transfer of engineering responsibility. (AFR 800-4)

System Manager (SM) - The AFLC Air Logistics Center designated to insure that logistics actions within AFLC are in consonance with functions to perform system program objectives and support requirements of commands that will use the system. (AFM 67-1)

System Program Office (SPO) - The office of the program manager and the single point of contact with industry, Government agencies, and other activities participating in the system acquisition process. (DOD 5000.1)

Systems Engineering Avionics Facility (SEAFAC) - The test facility managed by ASD/ENASD for certification of MIL-STD-1553A compliance of an avionics system or individual avionics components.

Three-Letter Organization Program Review (TOPR) - A formal review of a division's programs given to Col. Anderson once each month. The Navigation Systems Division presents its TOPR on the first Tuesday of each month.

SECTION IV

DISCUSSION QUESTIONS

1. Prepare a system diagram of the ASU program. What are the subsystems? What are the inputs and outputs of the subsystems? What are the inputs and outputs of the ASU system?

2. Identify the claimants on the ASU system and summarize the nature and extent of their claims.

3. Discuss the use of the team concept by Maj. Edwards. How effective was it on this program? Explain why or why not you would implement it differently.

4. Could relaxing the PVT requirement solve the schedule problem? What alternatives were available to Maj. Edwards and Col. Anderson?

5. Discuss the 50% scheduling policy of Westech. How did this affect the program?

6. Did the way that people are matrixed into AEA affect the success of the ASU program? Explain.

7. Discuss Maj. Edwards' and Col. Anderson's methods of planning on the program.

8. Discuss the execution process (organizing, directing, controlling) used in managing the ASU program.

9. Comment on Col. Anderson's role as a middle manager.

CHAPTER 3

ANALYSIS

Introduction

It appears that Westech's 50% scheduling policy was
the primary cause of the late deliveries on the Standard ASU
program. Three factors seem to have compounded the problem
in this case: (a) a breakdown in communications, (b) a lack
of planning on the program, and (c) Maj. Edwards' management
style. Collectively these caused a significant problem
which affected three other programs: the A-10 AAS program,
the Air Force standardization effort, and the SEAFAC
verification test program.

Schedule Policy

The delivery schedule problems seem to be rooted in
the optimistic nature of the Westech scheduling process. By
Westech basing its schedules on event dates which had a 50%
chance of occurring, it became extremely unlikely that any
of the schedules would be met. It is normal to plan
schedules with a certain amount of management reserve in
funding and timing. But this underestimation of the actual
timing requirements caused the schedules not to be met.
Furthermore, events that have a near equal probability of
happening or not happening cause the schedule to reflect
this same probability of success. Schedules should be based
on events with certainty of occurrence, but these ideal
schedules are only unattainable goals.

The Westech scheduling policy was not known by the government until late in the program when Maj. Edwards and Maj. Gen. Jackson visited Westech. Normally, SPO personnel expect some optimism in schedules, but not this much. Westech had used this type of scheduling for several years prior to the ASU program, and they did not recognize the far reaching ramifications of their common practice of scheduling. This type of scheduling policy has probably been used by aggressive contractors to enhance their position during competition and many times as a normal way of doing business. It appears that Westech used this practice in both manners.

Moreover, the lack of communication between Westech and the Navigation Division (AEAB) about the optimistic scheduling policy compounded the ASU program problems. While Westech saw things as typical, the true nature of the situation was degraded below acceptable limits. The partisan view of Westech allowed this condition to go unrecognized and the situation to further degenerate. It seems that actions were taken without consideration of the ripple effect on other programs and plans for these actions were devised without consideration for other users of this information.

As an aside to the scheduling issue the use of the milestone method of control is directly affected by this optimism. At ASD the milestone method of control is
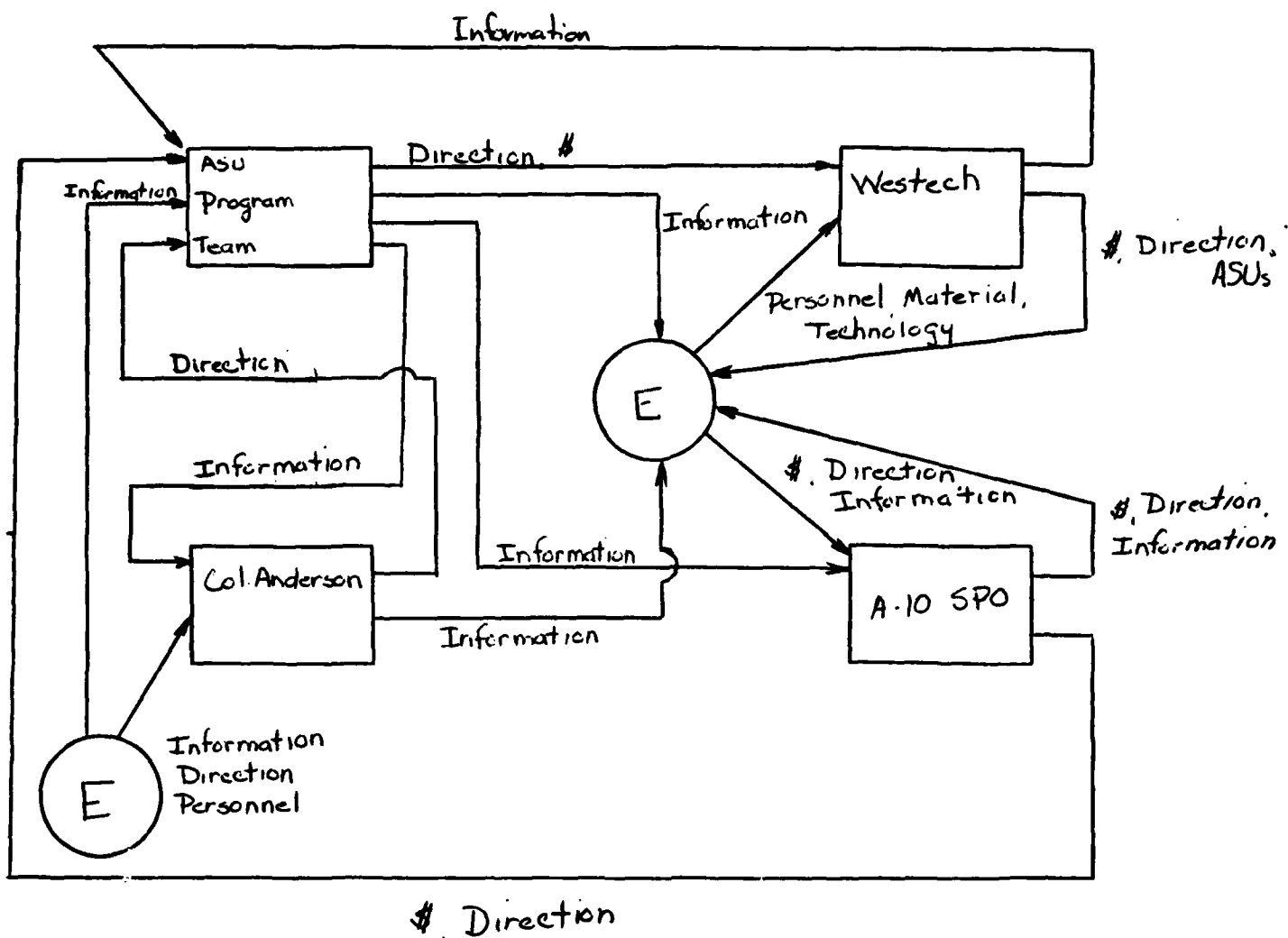
frequently used; this method is dependent on the validity of scheduled events. In this case, Westech's policy made the schedule events highly invalid.

Communications

The lines of communication in the standard ASU program are presented in figure 3, which is a diagram of the system in which Maj. Edwards and the rest of the people involved in the ASU acquisition operate. The three most significant lines of communication are those between Westech and the ASU program team, among the ASU program team members, and between the program team and Col. Anderson.

The failure to monitor the software development program, with the resulting slip in verification testing, shows the breakdown in communication between Westech and the ASU program team. Westech did not inform the ASU team of its failure to meet the internal development milestones. Westech apparently felt that with their additional personnel and effort, they could recover the time they had lost and still meet the scheduled SEAFAC test. They continued to believe this until the week before they were to arrive at the SEAFAC, when it finally became apparent that they would not be ready, and then informed Maj. Edwards.

It is easy enough to understand why they waited. No one likes to admit that they have not performed according to their promise. Also, they were making the extra effort that

Information

ASU Program Team

Direction #

Westech

Information

#. Direction. ASUs

Information

Personnel Material, Technology

Direction

E

Information

Information

#. Direction Information

#. Direction. Information

Col. Anderson

Information

A·10 SPO

Information

E

Information
Direction
Personnel

#. Direction

E- Environment/External Organizations

Figure 3

The ASU Acquisition System

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seemed necessary to make up the lost time, and felt that they did have a good chance of making it. If they had informed Maj. Edwards earlier that they were going to miss, Westech programmers, and they might have finished the development even later than they did.

However, they did not make up the schedule slip, and failing to notify the ASU program team earlier did not help Westech. They now had a credibility problem, and it would not be surprising if there were questions on other aspects of the program. Also, since the SEAFAC was performing testing for several other programs, it may not have been possible for the testing to be rescheduled on such a short notice; Westech may have ended up in the position of having to reimburse the government for the use of the SEAFAC facilities. As it turned out, the SEAFAC was able to reschedule other testing at the last minute and accommodate Westech when the development was finished. This took quite an effort by SEAFAC, and did not help Westech's reputation with the SEAFAC personnel.

Not all of the blame can be laid on Westech; the ASU program team had the responsibility of monitoring their contractor and ensuring that they would meet the requirements of the program. At the July TOPR, Mr. Hampton said that he had been aware of some problems with the software development, but that Westech had minimized the problems. Mr Hampton had not followed up on this

information and also had not kept Maj. Edwards informed of these "small" problems. Mr. Hampton had considered this to be strictly an engineering matter, nothing that the program manager should be involved with. The members of the program team generally had divided themselves into strict functional areas and there was little interaction. There was no common goal that served to focus the efforts of each individual.

Maj. Edwards could have worked to develop a team identity. He could have held regular meetings and gathered all of the members of his team so that there could have been a regular exchange of information. It may have been that several people held small bits of information that together could have indicated a larger problem. Even if new issues were not uncovered, these meetings would allow Maj. Edwards and others to get the latest status on the program, and he could then provide new direction to the team members based on the new information and the priorities he had for the various aspects of the program.

There was also a problem with the timing of the updates to Col. Anderson. Col. Anderson at first did not require status reports beyond the monthly TOPR briefings. This put him in the position of always managing in the past. He was never looking forward to prevent problems, but always looking back to solve them. Col. Anderson eventually recognized this and asked for daily reports after the

October TOPR   when it appeared that the initial units would
not be delivered on time.

<u>Planning</u>

Planning has been recognized as one of the basic
(perhaps the most basic) functions of the management
process.   Planning has been defined as the selecting and
relating of facts and the making and using of assumptions
regarding the future in the visualization and formulation of
proposed activities believed necessary to achieve desired
results (4:123).

Planning forms the basis of management actions,
providing in advance the goals of the program, the actions
necessary to attain these goals, and the methods of
measuring the accomplishment of the goals.   Without proper
and complete planning, a program must constantly be reacting
to events, rather than initiating action to avoid problems
and keep the program on track.

The standard ASU program suffered from a lack of
planning; it seems that all of the program personnel were
limited to a short-run perspective, with no concern for
actions which might have been necessary more than two weeks
in advance.

Poor planning was reflected in the reaction to
Westech's slip in software development.   The importance of
this development to the overall program was understated; Mr.
Hampton believed that by the time the hardware was designed

and built, the software problems would have been solved. Because of this attitude and the fact that Mr. Hampton's expertise was in hardware design, the software milestones were not tracked closely. No one knew that the overall program was in trouble because there was no defined method of measuring progress. The software development was assumed to be just one more activity Westech had to perform in order to build ASUs.

If the ASU program team had had an overall plan for Westech's design and development, they would have realized the importance of the software development. If they then realized that no one within the the present program team had the expertise to monitor the software, steps could have been taken to obtain help from within ASD. Apparently such expertise was available, since Maj. Edwards had been able to form a special review team after Westech was late. The slip in development might not have been such a problem if these people had been applied before missing the SEAFAC test, rather than after.

Another example of poor planning within the ASU program is the reaction after Westech actually failed to deliver in December. There were no actions that Maj. Edwards could then take to prevent an impact to the A-18 AAS program. What usually happens during situations like this (and did happen on this program) is that no effort is made to determine the best solution to the problem, because no

assessment had been made earlier of the potential implications of various actions. Instead, the first idea that seems as though it would work, and reduce the pressure from above to "do something", was chosen: Maj. Edwards elevated the problem to Col. Anderson, who in turn elevated it to Col. Smithson, who relied on Maj. Gen. Jackson. Maj. Edwards cannot entirely be blamed for his lack of planning--it seems that there was a general lack of it within the organization.

If planning had been done earlier in the program, more effective actions might have been available to Maj. Edwards after Westech failed to deliver. It would have been much easier early in the program to make provisions for additional use of the refurbishment "slaves", delay the start of FOT&E, and stretch out the backfill schedule. But waiting until these were all required simultaneously (which is what happened) meant tripling Maj. Edwards' workload while still trying to bring pressure on Westech to deliver.

One time to have done all of this planning was immediately after the award of the contract to Westech. There was a lull in the program after the rush of source selection; there would have been plenty of time to take stock of the program. Maj. Edwards would have had Westech's proposal fresh in his mind, and the specialists from the source selection evaluation board (SSEB) would also have been available. Since he now had only one contractor to

consider, he could have devoted all of his attention to planning out the production program with Westech's schedule.

The planning process should have first considered the purpose of the standard ASU program; whether it was primarily a standardization program, or if it was now simply a program for the government to supply ASUs to the A-10 AAS program. This, of course, overstates the case-- the program was both of these. The emphasis should have changed, however, to that of supplier; the direction for the development program had been essentially fulfilled, and there were no development funds identified in the future for additional development or qualification of vendors.

With the goal of supplying ASUs in mind, then, Maj. Edwards should have started with some readily identifiable event, such as first aircraft installation, and worked back from that event, listing the events which must preceed that event and the time required for these necessary events. For example, in order for the first aircraft installation to occur, three events must have occurred: delivery of the ASU, checkout of the ASU with the rest of the aircraft avionics, and delivery of the technical orders (TO) and information necessary for FRC to install the ASU and for the pilots to operate it. Maj. Edwards could then work back with those events for which he was responsible. As far as the TOs and information, the preceeding event was delivery of data from Westech to FRC for inclusion in their system

TOs. Given FRC's required leadtime from the first aircraft installation date, Maj. Edwards could then have determined the latest date for Westech's delivery. This process could have been repeated for all of the program events, leading to a complete schedule for the program.

With this list of events, schedule, and network of dependency, Maj. Edwards would have had much more control over the program. It would have been easy to predict the impact of the slip in software development if there had been this clear understanding of what else depended on this event, and when the full impact could have been expected.

Management Style

Maj. Edwards' management style exhibits two interrelated characteristics: (1) a very centralized work accomplishment pattern, i.e., an unusually high or over-extended "span of control" of program activity, and (2) the use of a management by exception policy. He seemed to be implementing the Air Force policy of "do more with less," but the infrequent delegation of work appears to cause a general inefficiency in using the expertise within the organization. (This expertise problem seems to be a function of manning and not necessarily quality.) This made it mandatory to use the management by exception policy. Management by exception only allows effort to be expended on those items with known, high priority problems. Furthermore, the need of a strong communication system was

paramount, but the shortfalls of the internal AEAB communication linkage caused the scheduling problem to go unnoticed. It should be noted that the management by exception policy is commonly used at ASD and centralized authority is often dictated by expertise level in certain management support areas, e.g.,engineering.

Summary

Westech's scheduling policy alone probably would not have caused major problems on this program, although it seems to have been the root cause of the late deliveries. The breakdown in communications allowed simple problems to go unnoticed until they became large problems, and the lack of program planning kept these large problems from being recognized.

If Maj. Edwards had known earlier about Westech's policy (communication problem), he could have adjusted his own estimates for delivery, and structured the rest of the program accordingly (planning problem).

Conclusion

Five general principles for program management can be inferred from this case:

a. Contractor assumptions in building schedules or other program plans should be uncovered by the program team.

Maj. Edwards accepted that the schedules published by Westech were based on the same assumptions that he used: milestone dates were likely to be met, and recovery from a

delay in the software development before delivery of ASUs was possible. This was exactly the opposite of what was the case and caused him to disregard some early warning signs on both the software development and the initial PVT.

An early discussion by Maj. Edwards with Westech on their schedule, along with the opinions of the other members of the program team, could have uncovered the 50% policy before it became a significant factor in the program. Actions could have been taken based on this information to bring high-level pressure on Westech much earlier than it was; this may have altered the priorities within Westech so that additional resources would have been given to the standard ASU program and the late deliveries could have been avoided.

As a general principle, then, a program manager should always ask what lies behind any schedule. He or she should ask what the probability of meeting the milestones is, what else that is not on the schedule that must happen in order to meet the schedule, and what changes might be required if the schedule is not met.

b. Milestone control is only as good as the information used to formulate the milestones and how well the activities are tracked.

Maj. Edwards relied on Westech meeting the software development schedule, and relied on the program engineers to track Westech's progress. He learned later that it was only

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a 50% schedule and the engineers had been willing to accept Westech's progress reports at face value. Warning of the slip in completion of the software and the testing at SEAFAC came too late for him to react and reduce the impact of these events.

Maj. Edwards could have uncovered the 50% schedule (as in a. above), and also could have asked for regular reports from the engineers on the status of Westech's engineering efforts in general and the software work in particular. After hearing the engineers merely repeat Westech's reports, he could have directed them to perform their own analysis of Westech's status and form an independent opinion of the completion and test dates. This would have given him a measure of how well Westech was meeting the schedule and whether any corrective measures were required.

A program manager can increase his effectiveness by realizing that the milestones put on a schedule usually are selected because they are the important ones. These are the ones that need to be watched closely; the contractor usually is using these milestones as a measure of his progress.

c. Internal communication links should be kept open.

The program engineers felt no responsibility for informing Maj. Edwards or the other members of the program team on the status of Westech's efforts. The knowledge they had of Westech's failure to meet the internal software

development schedule was not shared with other members of the ASU program team. This information could have shown an impact to other areas of the program, specifically in the logistics area and the development of support equipment. Maj. Edwards apparently did not encourage the exchange of information among the team members; he had a tendency to deal with each of them as individuals, with independent areas of responsibility.

The internal communication could have been improved with relatively simple measures. A weekly meeting with all the team members could have served as an informal forum for discussing the status of the various parts of the program, with an opportunity for team members to glean information from the others. Assigning people to work together on a project could also have encouraged the exchange of information, and helped to develop a "team spirit".

It is vital for any program to have an open exchange of information. A successful program manager is usually one that has seen the barriers to communication on his program and has worked to overcome them. This communication usually goes down the lines of authority as well as up or across them; subordinates usually work harder and more effectively if they have been given a clear understanding of the goals of a program and the actions required of them in order to meet these goals.

d. Thorough planning can prevent many problems.

        Maj. Edwards did not have a clear overall plan for
the   program;   consequently,   the warning   signals   of
difficulties with the software development and the   initial
PVT   went   unrecognized   until   it   was   too   late   to   take
measures to mitigate the effects of the late deliveries.

        The   effort required to develop a good program   plan
usually cannot be avoided. If planning is not done early in
the   program,   it   will be done for each crisis   that   comes
along--although it will be much less effective,   since   many
options   which   would   have prevented the problems   will   no
longer be available.   By doing a through job of planning at
the beginning of the program,   you can identify the critical
events   and   the milestones which lead   into   these   events.
Alternate means of achieving these milestones and events can
be developed, and held until they are needed.

e. Believe what your people tell you.

        Many   people   had expressed doubts   about   Westech's
ability to meet the contractual schedule.   Even as far back
as the source selection, questions had been raised about the
validity   of   Westech's proposal,   but no one had   had   firm
justification for not accepting the proposal at face value.
As it turned out,   Westech had a built-in problem from their
50% scheduling policy, which no one had known about until
much later.

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The suspicions of several people, taken together, may be closer to the truth than the hard facts from any one person. If people from three different areas all have general concerns--but no hard proof for their feelings--there is probably cause for investigation. This can indicate a problem with the general system that the contractor is using, even if there is nothing wrong with a specific area of the program.

CHAPTER 4

CONCLUSIONS/RECOMMENDATIONS

CONCLUSIONS

This research effort was conducted to capture the nature and environment of an acquisition organization within the Air Force. It focuses on the perspective of this organization from the middle management level as perceived by the researchers. The method of exposition, via a case study, provides a vehicle to examine and analyze the dynamic relationships of the essential parts. The case proper is the presentation of the SPO and the interrelationships at a comprehensible level. The analysis presents plausible reasons why these relationship exist and further seeks to define their origins.

In fulfilling the objectives of the research, a case study was written and analyzed. The case consists of a general description of the Avionics and Aircraft Accessories SPO, and a description of a specific program within the SPO. The analysis of the case expresses the authors' evaluation of the program and the actions taken to alleviate the problems encountered--the late deliveries, which were caused by a basic scheduling problem and compounded by three other factors: (a) a breakdown in communications, (b) a lack of planning on the program, and (c) the management style of the program manager.

There were five general principles of program management inferred from the analysis of this case. First, the assumptions used by a contractor to develop schedules or other program plans should be uncovered by the program team. Second, milestone control is only as good as the information used to formulate the milestones and how well the activities are tracked. Third, internal communication links should be kept open. Fourth, thorough planning can prevent many problems. Finally, believe what your people tell you.

RECOMMENDATIONS

General Discussion

The personnel attending the SYS 400 "Intermediate Program Management" course at AFIT will come from a wide variety of backgrounds, and will also be returning to a wide variety of programs. Not all of the course attendees will be coming from ASD, and not all of those from ASD will be managers within basket SPOs.

The case will still be useful in demonstrating general management principles and actions, but it may be effective to show as well how large weapons system acquisitions are managed at ASD, and how they differ from the relatively small program presented in this case. It would also be useful to present programs from the other AFSC product divisions, since they have different organizational structures (particularly with regard to engineering support) and different approaches to doing

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business. These differences are a result of both the systems which they are responsible for, and the precedence and corporate history of these organizations.

Recommendation #1

We recommend that another case study be written about one of the major aircraft acquisitions at ASD. This case study should concentrate on the management of a large SPO, showing how the integration of several programs or projects results in the eventual acquisition of a single weapons system.

We recommend that another ASD organization be used first because of the same time and TDY constraints faced when researching and writing this case study.

Recommendation #2

We recommend that a case study be written about representative programs in each of the other three AFSC product divisions. While it is certainly possible that the general management principles can be learned from the study of ASD programs, it would be useful to show other perspectives on the acquisition process.

Since some of the people taking the SYS 400 course will be returning to the other product divisions, a case study about one of those divisions may prove to be more immediately useful for those people. Also, personnel attending the course may eventually be part of another division as part of their career progression; a short study

of a case from that division may give an early appreciation
of how the divisions differ.

A. References Cited

1. Andrews, Kenneth R. The Case Method of Teaching Human Relations and Administration. Cambridge MA: Harvard University Press, 1953.

2. Galvin, Thomas J. The Case Method in Library Education and In-Service Training. Metuchen NJ: The Scarecrow Press, Inc., 1973.

3. Terry, George R. Principles of Management. Homewood IL: Richard D. Irwin, Inc., 1960.

4. Willings, David Richard. How to Use the Case Study in Training for Decision Making. New York NY: Holt, Rinehart, and Winston, Inc., 1971.

B. Related Sources

1. Carrol, Stephen J., Frank T. Paine, and John B. Miner. The Management Process: Cases and Readings. New York NY: Macmillian Publishing Company, Inc., 1977.

2. Hodge, B.J. Organizational Behavior: Cases and Situations. Intext Educational Publishers, 1974.

3. Payne, Bruce. Planning for Company Growth. New York NY: McGraw-Hill, Inc., 1963.

4. Summer, Charles E., Jerimiah J. O'Connell, and Newman F. Peery, Jr. The Managerial Mind. Homewood IL: Richard D. Irwin, Inc., 1977.

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